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Enclosed herewith for filing is a patent application, as follows:

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Title: "DUAL PLATFORM LOCATION-RELEVANT SERVICE"

X	Return Receipt Postcard
X	This Transmittal Letter (in duplicate)
11	page(s) Specification (not including claims)
5	page(s) Claims
1	page Abstract
6	Sheet(s) of Drawings
3	page(s) Declaration For Patent Application and Power of Attorney (unsigned)

CLAIMS AS FILED

For	Number Filed			Number Extra		Rate			Basic Fee $690.00
Total Claims	35	-20	=	15	x	$18.00	=	$	270.00
Independent Claims	1	-3	=	0	x	$78.00	=	$	0.00
☐ Fee of ____ for the first filing of one or more multiple dependent claims per application								$	
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DUAL PLATFORM LOCATION-RELEVANT SERVICE

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Kulbir Singh Sandhu

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a location-relevant service; in particular, the present invention relates to a location-relevant service accessible by multiple mobile devices.

2. Discussion of the Related Art

Location-relevant services, which provide information or perform services based on the geographical location of a mobile client, are becoming more available. A location-relevant service can be used, for example, by a trucking company to track the positions of its vehicles in service. Another application of location-relevant systems is to provide travel-related services (e.g., driving directions) based on the position of the client. One example of a location-relevant service is described, for example, in copending U.S. patent application "Method for Distribution of Locality-Relevant Information using a Network" ("Copending Application"), serial no. 09/422,116, filed October 20, 1999. To provide an example regarding the architecture and application of a location-relevant information system, the disclosure of the Copending Application is hereby incorporated by reference in its entirety.

Typically, a location-relevant system includes a location-relevant service server accessible by multiple mobile units over a communication system, which includes wireless links to the mobile units. The mobile units provide their positions based on a positioning system. The position of a mobile unit can be provided by, for example, the Global Positioning System (GPS) or, in a cellular telephone network, by a process called triangulation which is based on signal delays from system base stations of known fixed locations. Due to technology limitations at the present time, it is costly to integrate the capabilities of both positioning and wireless communication of such a mobile unit into a hand-held device. In addition, hand-held positioning devices are also typically less accurate than their more sophisticated bulky counterparts. Therefore, a mobile unit in a location-relevant service is typically fixedly installed on a vehicle. However, a mobile unit fixedly installed on a vehicle cannot provide the convenience and mobility of a hand-held unit.

Another desirable application that is not known in the prior art is accessing from a mobile unit location-relevant service based on the position of another mobile unit.

SUMMARY OF THE INVENTION

The present invention provides a location-relevant service system which includes (a) a location-relevant service server accessible over a data network (e.g., the Internet); (b) a first mobile unit coupled to the data network over a first wireless link which provides a position of the first mobile unit over the wireless link to the location-relevant service server; and (c) a second mobile unit coupled to the data network which receives from the location-relevant service server

location-relevant service based on the position of the first mobile unit. In one embodiment, the second mobile unit couples to the location-relevant service server over a second wireless link independent of the first wireless link. Alternatively, the first and second mobile units can share the first wireless link, which can be provided by either of the mobile units. Further, the first and second units can also communicate over a direct wired or wireless link. In a wired link environment, the wired link can be provided through a docking station in the first mobile unit adapted for accommodating the second mobile unit. The electrical interface between the first and second mobile units under such an arrangement can be provided by a standard interface, such as an industry standard serial bus commonly found in portable devices, such as a cellular telephone, lap top computer or a personal digital assistant.

The location-relevant service system of the present invention can operate in at least two modes: on-demand or "pushed." Under on-demand operation, location-relevant service is provided in response to a query received from the second mobile unit. Alternatively, under the pushed operation either the second mobile unit or a non-mobile unit can request a selected location-relevant service to be provided to the second mobile unit upon occurrence of predetermined events, or satisfaction of certain conditions (e.g., during a specified time period).

Location-relevant services can provide such information as traffic conditions, entertainment information, or travel-related information (e.g., detailed driving directions) relevant to the locality of the first mobile unit. Alternatively, the first mobile unit can be installed in conjunction with a monitor that monitors the operation conditions of a

vehicle. In that configuration, the first mobile unit can report operations or maintenance conditions of the vehicle to other users (e.g., the second mobile unit) through the location-relevant service server.

In one application, a user who is seeking a real property can specified in the location-relevant service server a search request for a list of real properties for inspection. The search result can be pushed to his cellular phone (i.e., second mobile unit, in this instance) based on the position receiver (e.g. GPS receiver) installed in his vehicle, when he arrives at the vicinity and requests from the second mobile unit his search results.

In addition to the GPS system, the present invention can also be used in conjunction with a terrestrial triangulation-based system. In one embodiment, the first mobile unit receives or computes its position using terrestrial triangulation.

In one application, the two mobile units can be used to authenticate a user in a business transaction. For example, the user conducting business on a cellular telephone can be authenticated by providing the location-relevant service server the position of the first mobile unit. (For example, the user is conducting this transaction from his vehicle, where the first mobile unit is installed). The location-relevant service server can independently verified this position by querying the first mobile unit. In such an application, if the first mobile unit is provided a display, the user can read the position off the display and key in the position information using the keypad on the second mobile unit (e.g., a cellular telephone).

The present invention is better understood upon consideration of the detailed description below and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows one embodiment of the present invention in a location-relevant service system 100.

Figure 2 illustrates a query-based operation of one embodiment of the present invention.

Figure 3 illustrates a "push-based" operation of one embodiment of the present invention.

Figure 4 shows system 400, in a second embodiment of the present invention.

Figure 5 shows system 500, in a third embodiment of the present invention.

Figure 6 illustrates a method for obtaining a receiver position based on the global positioning system (GPS).

Figure 7 illustrates a method for obtaining a receiver position based on terrestrial triangulation.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention provides access to a location-relevant service from a mobile communication device based on the position of another mobile unit. Figure 1 shows one embodiment of the present invention in a location-relevant service system 100. As shown in Figure 1, a conventional mobile unit 101 for accessing location-relevant service is in communication in a conventional manner with a location-relevant service server 106 over a communication or data network, such as the Internet. Mobile unit 101 consists of both position receiver 103 and communication portion 102. In addition, mobile unit 101 may include a visual display panel for displaying the position information received at position receiver 103. Position information can be expressed as actual longitudes and latitudes, or simply a location code. In addition, the "age" of the location information (i.e., the elapsed

time since the last time mobile unit 101 computes its position) can also be displayed.

As illustrated by system 100, mobile unit 101 can send its position data, for example, over a wireless link 113 with wireless gateway 104. Positional data can be received, for example, from a GPS system or a terrestrial triangulation-based system. Figures 6 and 7 illustrate methods for obtaining a receiver position based on a global positioning system and a terrestrial triangulation system, respectively. As shown in Figure 6, in a GPS system, receiver 605 receives from satellites 601-604 respective positions P_1, P_2, P_3 and P_4 and their times of transmission. Using its local time t, receiver 605 computes distances S_1, S_2, S_3, and S_4, which are respective distances of satellites 601-604 from receiver 605. Position P_R of receiver 605 can then be computed conventionally as a function of P_1, P_2, P_3, P_4, S_1, S_2, S_3 and S_4. As shown in Figure 7, under a terrestrial triangulation method, land-based transmitters 702-704 of known locations P_1, P_2 and P_3 each provide a signal from which receiver 701 computes respective distances S_1, S_2 and S_3 between receiver 701 and each of transmitters 702-704. The position P_R of receiver 701 can be computed conventionally as a function of P_1, P_2, P_3, S_1, S_2, and S_3. In addition to the computed position of mobile device 101, the time at which the position was obtained can be also provided location-relevant service server 106. This information would allow the user or location-relevant service server 106 to determine whether or not a more or less frequent update is necessary. The direction of travel of mobile unit 101 can also be provided to location-relevant service server 106. (Direction of travel can be used, for example, in a driving direction service to provide more accurate "turn by turn" driving directions

-- i.e., additional turns may be necessary to reorient the vehicle towards the destination)

Wireless gateway 104 relays the position data from mobile unit 101 over the Internet to location-relevant server 106 over via internet gateway 105. As in the system described in the Copending Application incorporated by reference above, location-relevant server 106 is accessible over the Internet by desk top client device 112 (e.g., a desktop computer) using conventional internet connection 111. Desktop client device 112 can be used to control subsequent processing of the position data received at location-relevant service server 106.

Unlike prior art systems, however, system 100 allows a second mobile device 110 (e.g., a cellular telephone, a personal digital assistant, or a laptop computer) to access information or service provided by location-relevant service server based on the position of mobile unit 101. As shown in Figure 1, location-relevant service server 106 provides location-relevant information to mobile device 110 by making such information available at an information depository 107 (e.g., a web server) accessible by mobile device 110 through wireless gateway 109 and internet gateway 108 via wireless link 119 and conventional data communication links 117 and 118. In one embodiment, a user can access information depository 107 using a browser adapted for a wireless communication protocol (e.g., WAP). (Although shown here as separate units, information depository 107 and location-relevant service server 106 can be implemented by the same server unit).

To access location-relevant service based on the position of mobile unit 101, the user of mobile device 110 provides authentication information (e.g., user identification and password) to location-relevant

service server 106. After establishing that the user of mobile device 110 has the requisite rights, location-relevant server 106 provides location-relevant service to the user of mobile device 110.

System 100 can operate under at least two modes of operations: "query-based" and "push-based" operations. Figure 2 illustrates a query-based operation of one embodiment of the present invention. As shown in Figure 2, under a query-based operation, location-relevant service is provided only when the user of mobile device 110 sends out a request for location-relevant service (step 201). At step 202, where location-relevant service server 106 receives the service request, it determines (step 203) if it requires an update of the position of mobile device 101. If an updated position is required, a request is sent to mobile device 101 to obtain mobile device 101's current position. Otherwise, at step 205, the most recently acquired position information stored at location-relevant service server 106 is used. Regardless of whether an update is obtained, the position data is used to render location-relevant service (step 206). Results or returned information is then provided to the user at mobile device 110 (step 207).

Figure 3 illustrates a "push-based" operation of one embodiment of the present invention. Under the push-based operation of Figure 3, at steps 301 and 302, mobile device 110 receives a command for a selected location-relevant service and enables the corresponding service at location-relevant service server 106. The selected service can be activated according to some conditions, such as a specified position reported by mobile unit 101. At the same time, at regular time intervals, mobile unit 101 provides its current position to location-relevant service server 106.

Location-relevant service server 106 waits on the specified conditions for triggering the selected location-relevant service (steps 303 and 304). When the conditions for the selected service are met, the selected service is performed in accordance with the position of mobile unit 101 (step 305). Depending on whether the selected service is to remain active (e.g., prior to the expiration of a specified time period), location-relevant service server 106 returns to wait for the triggering conditions (step 306), or proceed with other location-relevant services (step 307), as required.

Examples of other location-relevant information that can be provided includes: traffic, operating or maintenance conditions regarding the vehicle, entertainment (e.g., movies or shows played at nearby cinemas or theaters) or travel-related information (e.g., locations of nearby hotels, points of interests, gas stations, restaurants, driving directions etc.) In system 100, for example, prior to a trip, a user can specified from his desktop personal computer a list of location-related service requests. The user seeking to buy real estate, for example, may set requests for locations of open-house events, which will then be downloaded to mobile device 110 in the form of a paging message or an email, when mobile device 101 - which is installed in the user's car - arrives at the specified geographical vicinity.

The information at location-relevant service server 106 can be shared among users for many purposes. For example, the present invention provides a method for authentication for on-line transactions. For example, a user completing an on-line transaction with mobile device 110 can sign the transaction using the position data displayed on the display panel of mobile unit 101. The elapsed time since the position data was

obtained can also be displayed on the display panel and used to achieve further robustness. The other party to the transaction can authenticate the user through location-relevant service server 106, which independently query mobile unit 101 to obtain its position.

In system 100, mobile unit 101 and mobile device 110 communicate via separate wireless links 113 and 119. However, the operations described above and the attendant benefits can be achieved similarly using systems 400 and 500 of Figures 4 and 5, respectively, in alternative embodiments of the present invention. To simplify the following discussion and to avoid repetition, like elements in Figures 1, 4 and 5 are provided like reference numerals. In each of systems 400 and 500, rather than mobile device 101 sending positional data to location-relevant service server 106 via an independent communication link, the position information data of mobile device 101 and communication between mobile device 110 and location-relevant service server 106 share a common wireless link and an internet gateway. In system 400, mobile unit 101 and mobile device 110 communicate with each other over wireless link 402, and communicate with location-relevant service server 106 through mobile unit 110. Alternatively, as shown in Figure 5, mobile unit 101 and mobile device 110 communicate over a wired link 501, and communicate with location-relevant service server 106 through mobile 101's wireless link 113. Wired link 501 can be implemented, for example, by a docking station through a standard interface. For example, if mobile unit 101 is a lap top or a personal digital assistant, such an interface can be provided by a 1394 serial bus interface. As in Figure 1, in systems 400 and 500, location-relevant service server

107 can be accessed from non-mobile or desktop client 112.

The above detailed description is provided to illustrate specific embodiments of the present invention and is not intended to be limiting. Numerous modifications and variations within the scope of the present invention are possible. The present invention is set forth in the following claims.

CLAIMS

What is claimed is:

1. A location-relevant service system, comprising:

a location-relevant service server accessible over a data network;

a first mobile unit coupled to said data network over a first wireless link and providing a position of said first mobile unit over said wireless link to said location-relevant service server; and

a second mobile unit coupled to said data network, said second mobile unit receiving from said location-relevant service server location-relevant service based on said position of said first mobile unit.

2. A location-relevant service system as in Claim 1, wherein said second mobile unit couples to said data network over a second wireless link independent of said first wireless link.

3. A location-relevant service system as in Claim 1, wherein said second mobile unit couples to said data network over said first wireless link.

4. A location-relevant service system as in Claim 1, wherein said first wireless link is provided by said second mobile unit.

5. A location-relevant service system as in Claim 1, wherein said first mobile unit and said second mobile unit communicate with each other over a second wireless link.

6. A location-relevant service system as in Claim 1, wherein said first mobile unit and said mobile unit communicate with each other over a wired link.

7. A location-relevant service system as in Claim 6, wherein said wired link is provided by a docking station.

8. A location-relevant service system as in Claim 6, wherein said wired link is provided by a standard interface for hand-held devices.

9. A location-relevant service system as in Claim 1, wherein said location relevant service is provided to said second mobile unit in response to a query by said second mobile unit.

10. A location-relevant service system as in Claim 1, wherein said location-relevant service is pushed to said second mobile unit.

11. A location-relevant service system as in Claim 1, wherein said location-relevant service is pushed to said second mobile unit upon satisfaction of a condition specified to said location-relevant service server.

12. A location-relevant service system as in Claim 1, wherein said data network comprises the Internet.

13. A location-relevant service system as in Claim 1, wherein said location-relevant service server is accessible by a non-mobile computer coupled to said data network.

14. A location-relevant service system as in Claim 13, wherein said non-mobile computer request said location-relevant service to be provided to said second mobile unit.

15. A location-relevant service system as in Claim 14, wherein said location-relevant service relates to an operating condition of a vehicle in which said first mobile unit is located.

16. A location-relevant service as in Claim 14, wherein said location-relevant service is to be provided to said mobile unit within a specified time period.

17. A location-relevant service system as in Claim 1, wherein said second mobile unit comprises a cellular telephone.

18. A location-relevant service system as in Claim 1, wherein said second mobile unit comprises a portable computer.

19. A location-relevant service system as in Claim 1, wherein said second mobile unit comprises a personal digital assistant.

20. A location-relevant service system as in Claim 1, wherein said location-relevant service relates to traffic condition.

21. A location-relevant service system as in Claim 1, wherein said location-relevant service relates to entertainment.

22. A location-relevant service system as in Claim 1, wherein said location-relevant service relates to travel-related information.

23. A location-relevant service system as in Claim 1, wherein said location-relevant service relates to driving directions.

24. A location-relevant service system as in Claim 1, wherein said location-relevant service relates to a real estate transaction.

25. A location-relevant service system as in Claim 1, wherein said position of said first mobile unit is being provided by a GPS receiver in said first mobile unit.

26. A location-relevant service system as in Claim 1, wherein said position of said first mobile unit is provided by a location sensor based on terrestrial triangulation.

27. A location-relevant service system as in Claim 1, wherein a business transaction is carried out by a user using said second mobile unit over said first wireless link.

28. A location-relevant service system as in Claim 27, wherein said business transaction includes an authentication step using said position of said first mobile unit to authenticate identity of said user.

29. A location-relevant service system as in Claim 28, wherein said business transaction includes an authentication step of said user at said second mobile unit.

30. A location-relevant service system as in Claim 1, wherein said second mobile unit obtains said position of said first mobile unit via said location-relevant service server.

31. A location-relevant service system as in Claim 1, wherein said second mobile unit obtains said position of said first mobile unit directly from said first mobile unit.

32. A location-relevant service system as in Claim 9, wherein said location-relevant service server requests an updated position of said first mobile unit according to a schedule specified in said query.

33. A location-relevant service system as in Claim 1, wherein said first mobile unit includes a display panel for displaying said position of said first mobile unit.

34. A location-relevant service system as Claim 33, wherein said display panel displays an elapsed time relative to the time said position of said first mobile unit is obtained.

35. A location-relevant service system as in Claim 1, wherein said first mobile unit provides said location-relevant service server also a direction of travel of said first mobile unit.

35. A location-relevant service system as in Claim 1, wherein said location-relevant service server incorporates said direction of travel in providing a driving direction service.

DUAL PLATFORM LOCATION-RELEVANT SERVICE

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ABSTRACT OF THE DISCLOSURE

A location-relevant service system provides location-relevant information to, or performs location-relevant service for, a first mobile unit based on the location of a second mobile unit. In one instance, the first mobile unit is fixed on a vehicle, while the second mobile unit can be provided as a cellular phone. In another intance, the first mobile unit is provided with a display panel, so that authentication can be achieved through providing the displayed location information to a location-relevant service server using the second mobile unit.

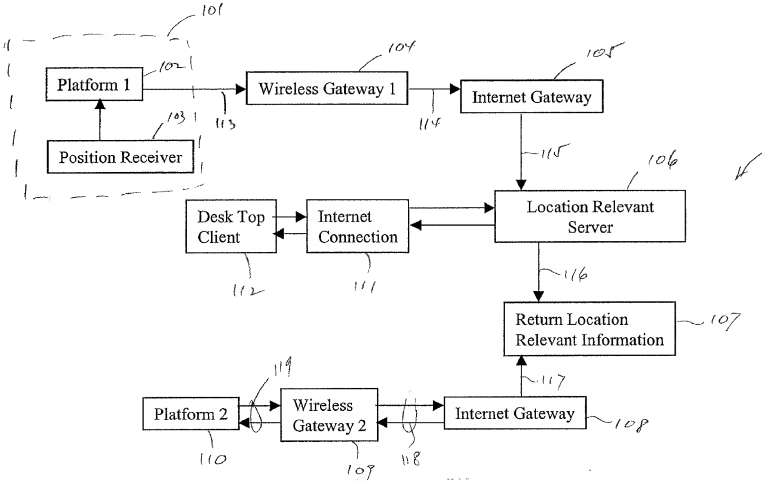

FIGURE 1

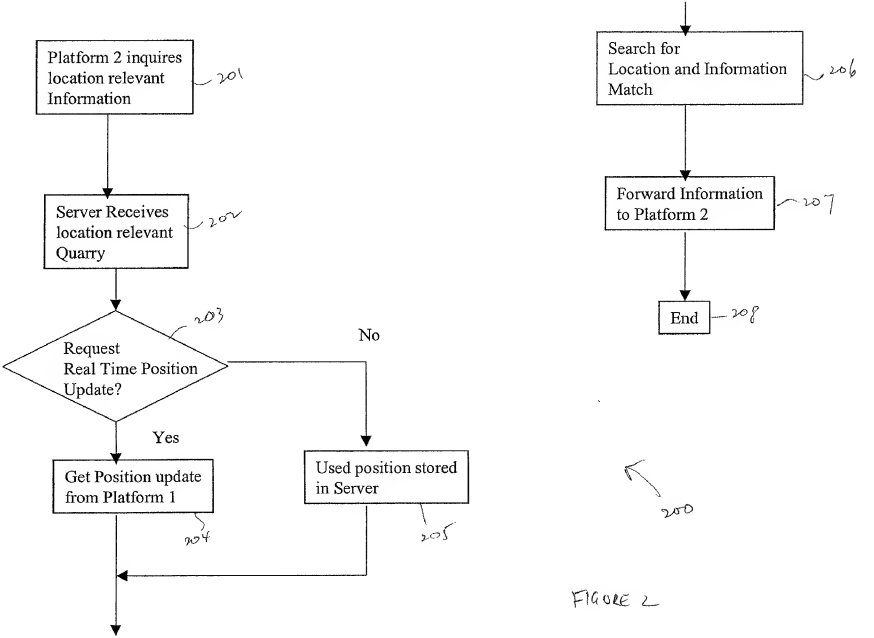
Platform 2 inquires location relevant Information
201
Server Receives location relevant Quarry
202
Request Real Time Position Update?
203
No
Yes
Get Position update from Platform 1
204
Used position stored in Server
205
Search for Location and Information Match
206
Forward Information to Platform 2
207
End
208
200

FIGURE 2

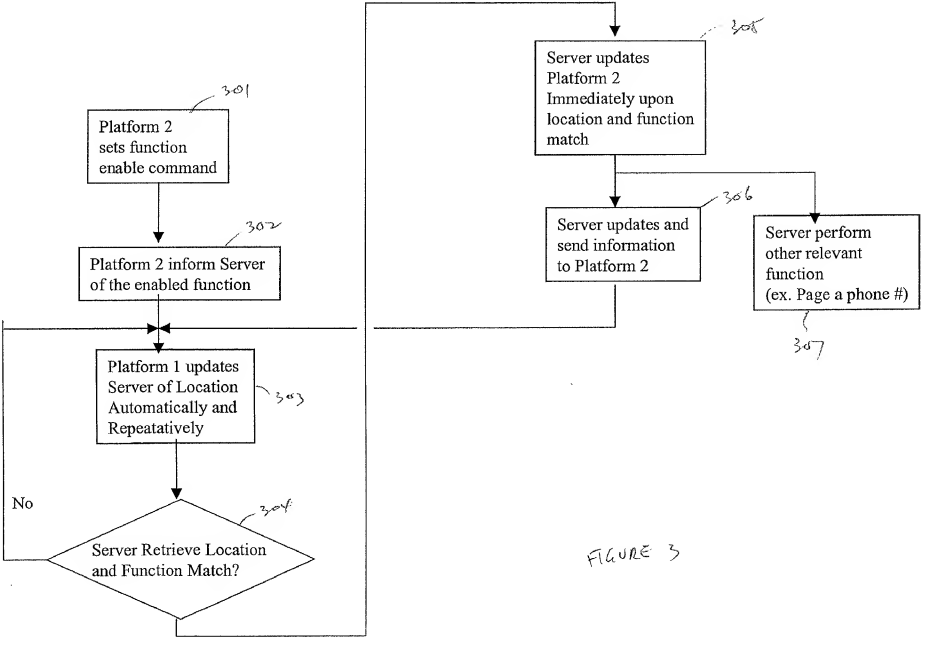

FIGURE 3

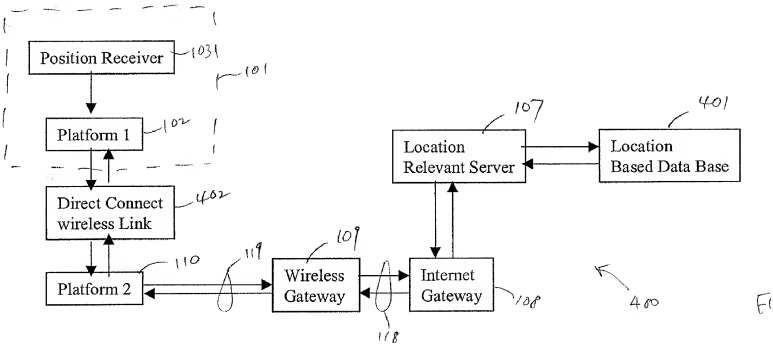

FIGURE 4

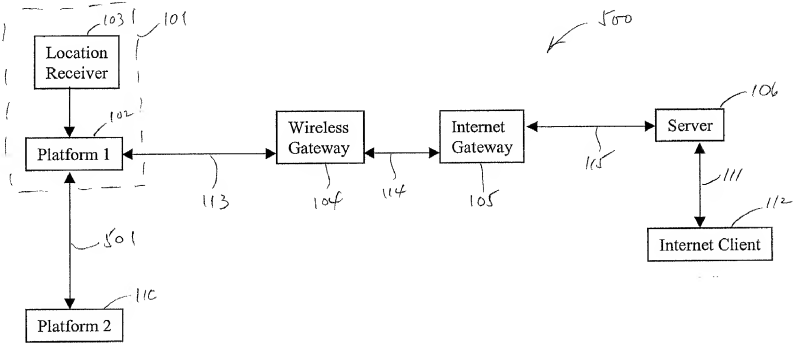

FIGURE 5

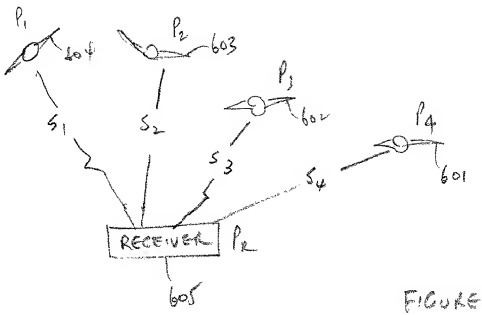

FIGURE 6

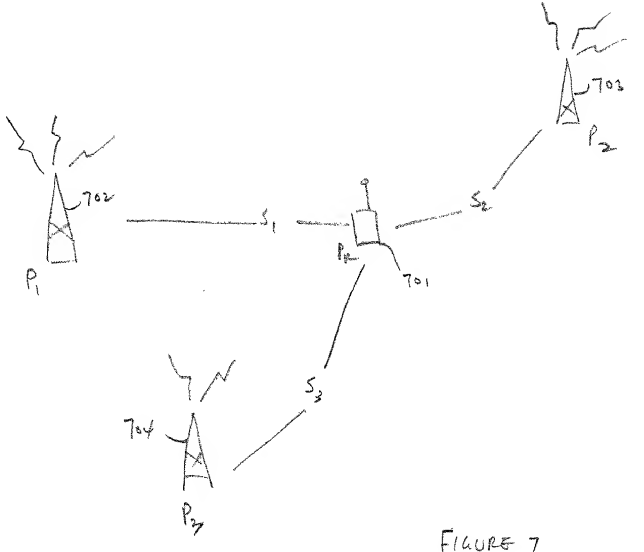

FIGURE 7

DECLARATION FOR PATENT APPLICATION
AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below adjacent to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of subject matter (process, machine, manufacture, or composition of matter, or an improvement thereof) which is claimed and for which a patent is sought by way of the application entitled

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which (check) ☒ is attached hereto.
☐ and is amended by the Preliminary Amendment attached hereto.
☐ was filed on _____ as Application Serial No.
☐ and was amended on ___ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) of any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
Number	Country	Day/Month/Year Filed	Yes	No
N/A			☐	☐

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Provisional Application Number	Filing Date
N/A	

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or PCT international application(s) designating the United States of America listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information, which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56, which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

Application Serial No.	Filing Date	Status (patented, pending, abandoned)
N/A		

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith:

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